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ABSTRACT

To achieve the goals of environmental quality, new thrusts have been placed upon environmental education. Although successful development of this process must be based on sound research, little attention has been given to searching out, organizing, and reporting research in the environmental education area. The purpose of this report is to: (1) identify known research pertaining to environmental education, (2) review critically the identified research, and (3) identify areas for further research. Studies selected (94) include: (1) attempts at objective evaluation of programs, outcomes, attitudes, and administrative procedures, and (2) works related to elementary-secondary school, college or adult levels of educational concern. The review is limited to research completed since 1950 with the exception of certain documents of historic significance. Summary statements indicate that researchers addressed themselves to numerous aspects of environmental education, such as problems of philosophy, program development, evaluation of instructional materials, selection of sites appropriate for learning, and outcomes of programs. None of them, however, appeared to have considered environmental education on other than a local, regional, or national basis. The reviewers felt if environmental education is to be truly effective, it must emphasize the world-wide nature of the problems. (BL)

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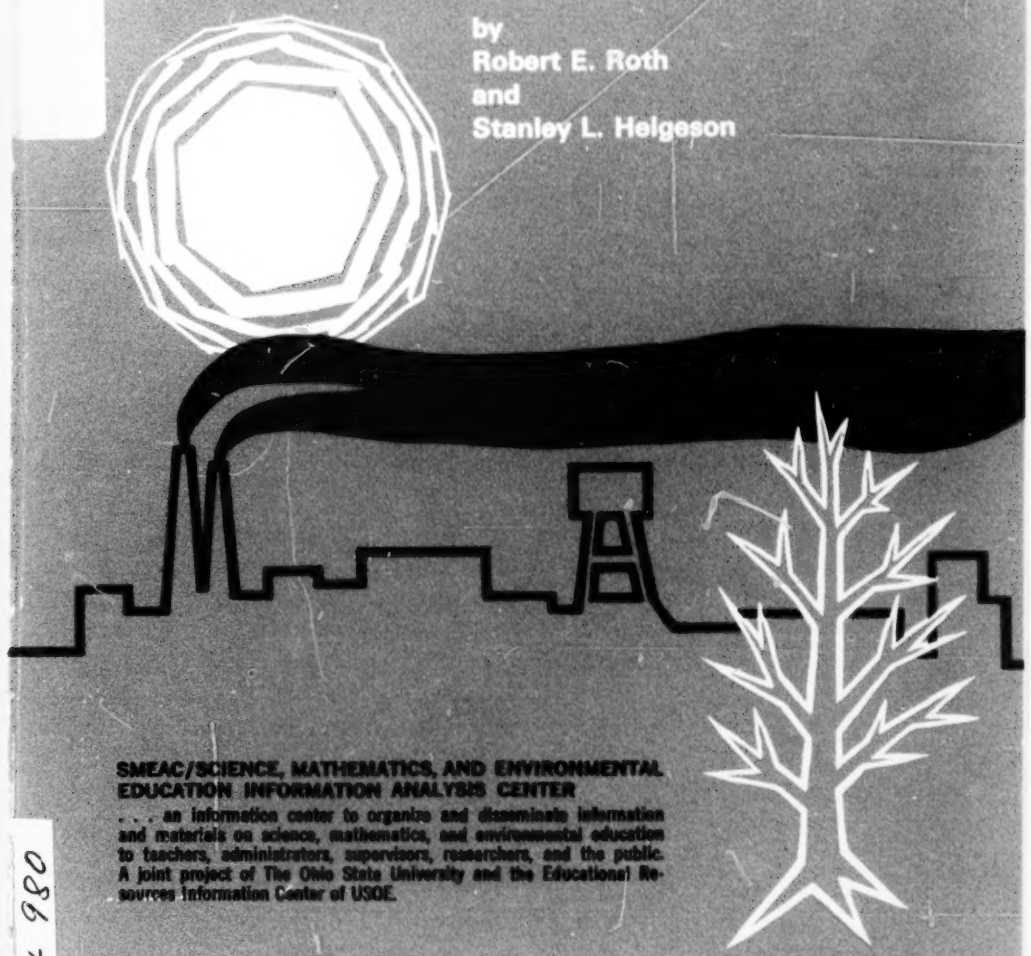
# A Review Of Research Related To Environmental Education

by
Robert E. Roth
and
Stanley L. Helgeson



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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

RESEARCH REVIEW SERIES — ENVIRONMENTAL EDUCATION
PAPER 1

# A REVIEW OF RESEARCH RELATED TO ENVIRONMENTAL EDUCATION

by

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September, 1972

## ENVIRONMENTAL EDUCATION INFORMATION REPORTS

The Environmental Education Information Reports are being developed to disseminate information concerning documents analyzed at the ERIC Center for Science, Mathematics and Environmental Education. The Reports include five types of publications. *General Bibliographies* are being issued to announce most documents processed by the Center for Science, Mathematics and Environmental Education. These bibliographies are categorized by topics and indicate the availability of the document and the major ideas included in the document. *Special Bibliographies* are being developed to announce availability of documents in selected interest areas. These bibliographies will list most significant documents that have been published in the interest area. *Guides to Resource Literature for Environmental Education* are bibliographies that identify references for the professional growth of teachers at all levels. *Occasional Papers* will be issued periodically to indicate implications of research for the teaching of environmental education. *Research Reviews* will be issued to analyze and synthesize research related to environmental education over a period of several years.

The *Environmental Education Information Reports* will be announced in the*SMEAC Newsletters* as they become available.

## RESEARCH REVIEWS - ENVIRONMENTAL EDUCATION

Research reviews are being issued to analyze and synthesize research related to the teaching and learning of environmental education completed over a period of time. It is hoped that these reviews will provide research information for development personnel, ideas for future research, and an indication of trends in research in environmental education.

Your comments and suggestions for this series are invited.

PATRICIA E. BLOSSER
and
ROBERT W. HOWE
Editors

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# I. Introduction

President Nixon stated in his August, 1970 message to Congress by occasion of the first annual report on his Council on Environmental Quality (61) that

> "We must seek nothing less than basic reform in the way our society looks at problems and makes decisions. Our educational system has a key role in bringing about this reform . . . . It is also vital that our entire society develop a new understanding and a new awareness of man's relation to his environment that might be called 'environmental literacy.' This will require the development and teaching of environmental concepts at every point in the educational process." (p. vii)

The American people are determined to make the 1970's the "Environmental Decade" according to Commissioner of Education, S. P. Marland, Jr.

> Commissioner Marland carried the point farther when he indicated: " . . . we now see environmental education as a new approach to learning. Even as attitudes of individual worth, free agency, democratic consent, and cooperative effort are learned subconsciously in many parts of the school curriculum, so must new attitudes of environmental concern pervade each subject, each course, and each discipline, whether mathematics, English, science, social studies, music, or whatever. Environmental education is interdisciplinary, pervading in spirit of all teaching at all levels." (55:8)

In order to achieve the goals suggested by President Nixon and Commissioner Marland, the new thrusts in environmental education must be based upon sound research. However, little attention has been given to searching out, organizing, and reporting research in the environmental education area.

The purpose of this report is to: (1) identify known research pertaining to environmental education, (2) review critically the identified research, and (3) identify areas for further research.

## CRITERIA

Research selected for this report includes: (1) attempts at objective evaluation of programs, outcomes, attitudes, and administrative procedures, and (2) works related to elementary-secondary school, college or adult levels of educational concern. This review was limited to research completed since 1950, with the exception of certain documents of historic significance.

For purposes of this review the terms, *"environmental education," "outdoor education," "conservation education,"* and *resource-use education"* were utilized to identify research reports. Since the present concern is environmental, the following definition of "environmental education" is utilized as a basis for review:

> Environmental Education is a process of developing a citizenry that is:
> 1. knowledgeable of the interrelated biophysical and sociocultural environments of which man is a part;
> 2. aware of the associated environmental problems and management alternatives of use in solving these problems; and
> 3. motivated to work toward the maintenance and further development of diverse environments that are optimum for living. [Roth (70)].

# II. Philosophy and Goals

The development of philosophy and goals appropriate for environmental education is in its infancy. Studies peripherally related to this area include Fitzpatrick's (23) attempt to develop a statement of philosophy for outdoor education and to identify its goals. Fitzpatrick identified some goals appropriate for outdoor education by soliciting questionnaire responses from persons in outdoor education and submitting them to three juries of ten persons each. Nine goals of outdoor education were produced by this procedure, with eight receiving the majority of support. Goals selected included the following three exemplars:

1. To help realize, through outdoor education, the full potential of the individual toward optimum development of mind, body, and spirit;
2. To utilize fully and constructively resources beyond the classroom as a stimulus for learning and a means of curriculum enrichment;
3. To develop an awareness, appreciation, and understanding of the natural environment and man's relation to it.

Based on such goal statements, outdoor education was defined by Fitzpatrick as:

> "A method which utilizes resources beyond the classroom as a stimulus for learning and a means for curriculum enrichment . . . The knowledge obtained through this direct approach to learning should enable the individual to better understand the unity of all life. It should also help him to develop a sense of pride for the historical, educational, scientific, recreational, and inspirational values that are a part of his heritage. Ultimately, he should be able to play a more constructive role in the society of which he is a part."

Similarly Rogers (69) and Wiener (93) approached the general problem of gathering points of view, organizing and analyzing thoughts in outdoor education, and developing a rationale for outdoor education. Hammerman (33) focused on the rise and development of school

camping as a part of the total school curriculum, while Yambert (94) attempted to identify principles and concepts appropriate for conservation which resulted in a different form of reference from that existing previously.

Rogers (69) defined outdoor education as: ". . . a method of approaching educational objectives through guided, direct, real-life experiences in the out-of-doors, utilizing as learning materials the resources of the natural environment." Twenty-one objectives were approved by nine authorities in the field. Such diverse statements as "to develop self-reliance," and "to increase the capacity for worthwhile emotional reactions" were suggested. Forty-nine principles (covering such wide spread areas as the expanding environment, real-life experiences, planning, school-community planning, teacher roles, and guides to administration) were also approved by a jury.

Wiener (93) followed the lead of Rogers and attempted to examine and analyze the historical development of the basis for outdoor education and to suggest a current rationale. Wiener examined the writings and contributions of Lloyd B. Sharp (73) and Julian W. Smith (77) to determine the present basis of outdoor education. Specific elements of their rationales focused on the uniqueness of the outdoors as a setting for meaningful learning experiences. Finally, Wiener (93) suggested that "the uniqueness of the outdoors as a setting for learning experiences is basically an expression of the unity of the universe of which man is an integral part."

Hammerman (33) explored another thought in outdoor education using the basic premise that the development of camping education was a natural outgrowth of the socio-economic forces at work in America during 1930-1960. Hammerman suggested that the trend towards urbanization necessitated the return to the elementary satisfaction arising from outdoor living obtainable through school camping. School camping became another means for extending the range of experiences of every school child. The roots of camping in school theory were suggested as being traceable to Pestalozzi, Spencer, Rosseau, and Hobart.

While developing a framework of "predictive and descriptive generalizations" pertaining to the field of conservation, Yambert (94) surveyed and analyzed studies of generalizations related to conservation (as contrasted with outdoor education) teaching at the elementary and secondary levels. The results of the literature analysis consisted of 12 generalizations suggested as a basic framework for conservation education. This was a first attempt to develop a framework of generalizations going beyond the agrarian orientation indicative of conservation teaching to this point in history.

## SUMMARY

The preceding studies are of important historical interest because they provide a better understanding of the present concern for the development of environmental education, and of other similar position statements, definitions, rationales, principles, guides, and concepts. All are areas which merit further consideration. Considerable effort ought to be expended to further clarify the role of environmental education as previously defined in relation to the present concept of the role of the school and of the citizens' responsibility.

# III. Instructional Concerns

## CONCEPTS, PRINCIPLES AND CURRICULUM DEVELOPMENT

Studies related to the development of concepts and principles for environmental education have continued since the beginning of education, but those concerned specifically with conservation and environment have been initiated only recently. Graff (30) suggested that investigators in conservation education from 1939 to 1950 were mainly concerned with the status of conservation teaching on a regional or national basis. Since 1950, the development of testing procedures to assess levels of knowledge about conservation among junior and senior high school students has been attempted, emphasizing multiple choice tests (15). Few studies have been designed to identify conservation concepts, principles, or understandings for public school use.

Studies included in this section will be considered in the following categories:

1. Development of conservation and environmental concepts;
2. Determination and organization of principles and concepts for purposes of teaching;
3. Curriculum development.

### Developing Concepts

Of historic significance among the few existing studies dealing with the development, validation, and organization of "principles," "concepts," "understandings," and "generalizations" for the teachings of conservation and environment are a study of conservation "principles and concepts" for secondary schools [Visher (87], the development of a list of "con-

servation concerns" for the evaluation of interdepartmental conservation teaching at the University level [Hanselman (35)], an attempt to associate "conservation understandings with community resources in a specific geographic region" [White (92)], and a study to develop a taxonomy of "conceptual objectives" for use in planning programs of instruction related to environmental management education [Roth (70)].

Visher (87) attempted to determine those conservation principles and concepts desirable for secondary school students. An original list was developed by analyzing 15 conservation textbooks, 9 books for general reading, 2 special conservation issue journals, 1 reprint series, 5 professional publications for teachers, and 4 doctoral dissertations. The list produced was submitted to 11 specialists in conservation for refinement and critical analysis. The refined list was then submitted to five nationally recognized leaders familiar with instruction at the secondary level. The study resulted in a list of 477 concepts which included the following numbers of concepts classified by area: soil-85; water-56; forests-55; recreation-37; human resources-38; and general-78. This attempt resulted in a considerable expansion of both the number and quality of concepts appropriate for conservation education.

Hanselman (35) investigated the scope of the conservation education afforded the majority of students at The Ohio State University. Specifically he measured the current status of interdepartmental conservation-related teachings presented through large enrollment courses. Procedures included: (1) a literature review to develop a list of important conservation concepts and concerns which "should" be included in conservation education; (2) revision and correction of the list by 24 leading conservationists, e.g., economists, geographers, ecologists, agronomers, etc.; and (3) development of two survey instruments: an 18-page topic survey to determine the scope, and a 2-page opinion questionnaire to be used along with informal interviews with each of 54 cooperating professors. A list of 108 conservation-related topics covering 15 areas: economic, ecological, socio-cultural, etc. was developed.

Analysis of the results indicated that the professors had a keen interest in conservation education and a concern for improving it. Another conclusion was that the conservation education received by most students in attendance was spotty and inadequate. Hanselman's investigation provides a basis for developing an effective conservation education program through interdepartmental approaches in that both the concepts developed and the apparent interdepartmental concern and interest in conservation education could be combined to implement a refocused approach to conservation education.

White (92) sought ". . . to determine some important conservation understandings that might be desirable for conservation education in Grades 4 through 12," and ". . . to identify some community resources which could assist in the teaching of these conservation understandings." Related literature was examined. A list of understandings was developed and organized into nine resource areas for evaluation by people knowledgeable in each of the areas. The desirability of each resource area was rated by 30 people classified as teachers in elementary schools, secondary schools, or colleges or as professional conservationists or interested resource personnel. Using a 5, 4, 3, 2, 1 rating scale, a mean score of at least 3.0 was used as the criterion for acceptance of the item. Of the 274 understandings evaluated: (1) 271 met the criterion; (2) all were associated with community resources in the geographic area in which the study was conducted; (3) 103 of the understandings were judged as appropriate for field study; and (4) 168 were appropriate for teaching in the classrooms. A marked individual difference in opinion on the majority of understandings was observed among professional conservationists and college teachers. It was also concluded that since 172 understandings were scored in the range from 1-5, conservation understandings more acceptable to conservationists were needed.

Roth (70) attempted to develop a taxonomy of conceptual objectives for use in planning programs of instruction related to environmental management (K-16) and to determine whether or not biases existed among selected representatives of disciplines and ecological regions relative to those conceptual objectives.

Survey techniques were used to obtain and validate appropriate environmental management education concepts. These involved written questionnaires and personal interviews. Responses were received from 350 of 699 (50.7%) members of a national panel. Of 128 concepts, 111 met the criterion of acceptance by 90% of the respondents. Roth's examination of the 17 unacceptable concepts and the frequency of rejection of each on the basis of response by professional area or ecological region provided little evidence to support any speculation regarding the existence of possible bias.

Scholars from the 40 professional areas and 12 ecological regions in the United States agreed on the majority of concepts to be emphasized in environmental management education. Roth suggested that the topical organization used represents a more useful and appropriate structure of concepts than do the agrarian-focused conservation concepts and organizations existing in many school curricula and educational materials.

*Summary.* Defining concepts appropriate for environmental education has been proceeding over time but to provide a sound conceptual structure for all areas of the curriculum will require more concerted effort. Conceptual structure, scope and sequence determination, and curriculum plans are areas for further research.

## Organizing Principles and Concepts for Teaching

Early investigations in conservation education dealt with inventorying the extent of conservation teaching throughout the United States or in given geographic areas. The kinds of information being taught, the sources of conservation understandings, and the extent of conservation teaching were topics studied by Sherman (76), Glidden (29), Donnelly (21), Irish (47), Caldwell (10), Hone (43), and Kenyon (50).

Sherman (76) conducted a study designed to ". . . compare the conservation attitudes possessed by elementary school teachers in training with those of specialists in conservation;" and to ". . . investigate the extent to which conservation information and other selected factors may be related to the possession of these attitudes." The procedures included use of an attitude inventory, an information test, and a questionnaire, all of which were administered to 1,626 respondents from selected state teachers colleges in Missouri and Kansas.

Results obtained indicated that: (1) the attitude inventory was useful; (2) common factors were operating to influence conservation information and attitude attainment; (3) additional science training increased the amount of conservation information and the number of attitudes held by the respondents; (4) conservation courses were held to be responsible for a rise in conservation information acquisition; and (5) inability to make clear-cut decisions on conservation issues was related to a lack of information and/or sufficient experience. Sherman concluded that conservation should be an integral part of the curriculum, that a direct teaching methodology is better than incidental or indirect methods, and that specific materials and technical help on conservation are needed.

Irish (47) conducted an investigation designed to ". . . select and organize, from periodical literature, printed materials concerned with soil conservation suitable for integration with courses of high school science for general education." A second phase of the study was to ". . . assign the various aspects of the selected printed materials to scientific principles and/or attitudes as described by other investigators." Procedures included:

1. Construction of an outline consisting of the topical areas related to soil conservation.
2. Analysis of a month's issues of four newspapers and a year's issues of three magazines.
3. Selection of 49 "aspects" (e.g., "contour cultivation," or "to determine water content in watersheds") of soil conservation and organization of the "aspects" into five major categories.
4. Assignment of values to each of the 49 "aspects" by five specialists in the teaching of science.
5. Analysis of results and the assignment of each of the 33 "aspects" receiving positive values to appropriate related lists of principles.

A useful technique used by Irish was the rating scale designed to determine the relative values assigned to each "aspect" of soil conservation. The scale, developed by Blanchet (8), uses algebraic sums of the evaluations of the various items under analysis as an indication of the true value of the item.

Glidden (29) attempted to determine: (1) "What principles within the area of soil and water conservation should be developed at the secondary school level?", (2) "How well are these principles being learned from active participation in American life, as from schools, club work, reading, listening to radio, etc.?", and (3) "Do modifications of the secondary school curriculum in the area of soil and water conservation seem desirable?"

Twenty-nine publications (bulletins, pamphlets, and monographs) were obtained from soil and water conservationists. A list of 100 principles was developed and sent to experts in soil and water conservation to check for validity. A refined list of principles was then sent to two groups of specialists in education: 43 science educators and 34 specialists in secondary education and curriculum ". . . for evaluation of adaptability and importance for the secondary school curriculum." The principles were rated on the basis of appropriateness for use as an objective to guide the selection of learning experiences for all pupils at some point in the junior or senior high school curriculum.

When a 6-point scale was used to evaluate 100 principles, 34 were eliminated. A Chi square test of ratings of the two groups of evaluators revealed no significant differences. A 66-item objective test, based on the 66 principles retained, was developed and administered to second semester seniors in 33 schools in different parts of the United States. A mean score of 44.18 for 1,021 cases was secured. On that basis Glidden concluded that high school seniors are not adequately informed in the area of soil and water conservation. In addition he suggested that secondary school curricula should be modified to include more effective teaching in this area. Glidden's 1953 study represents the first scientifically developed

research approach to determining the basic principles of any area of conservation. A basis for looking at differences of opinion between groups of experts and among representatives of various regions of the country about the importance of certain principles is also suggested.

Caldwell (10) conducted a study to determine earth science principles to be included in science programs in the general education curriculum of the secondary school and to determine the relative importance of each of those principles. The three phases involved in the study were: (1) the compilation of source materials in earth science from 13 textbooks, 8 reference books, 4 bulletins, and 2 research investigations; (2) an analysis of these source materials for tentative statements of earth science principles; and (3) a determination of the relative importance of 344 earth science principles selected to be included in a secondary school science program.

A validity check was accomplished by comparing the investigator's selected list of 344 principles with a list derived independently by an assistant in biology who used the same technique on 50 pages of source material. After the list was submitted to two science teachers to eliminate duplication, 332 of the original 344 principles remained. The principles were then evaluated on a 3 category scale (+3 highly desirable, +2 desirable, −2 undesirable) by five educators to determine relative importance for inclusion in the secondary school science program. The ratings given were tabulated and the sum of the ratings for each principle was recorded. The remaining 292 principles were arranged in a descending order of importance. The form of the rating scale proved to be useful in describing the relative importance of each item and also in eliminating objectionable statements of principles from the list.

***Summary.*** Studies have been conducted to determine proper placement or attainment of environmental related concepts in various curricular areas. Status studies of the type reported would be useful in comparing the latest thinking in concept development with new materials being produced for curriculum development and teaching.

## Curriculum Development

A determination of the conservation ideas of two groups of urban sixth grade students was made by Donnelly (21). One group of 182 students responded to 20 multiple-choice items. The other group of 100 students responded to "free-response" items involving the same questions. The

five categories of questions developed after reading and conferring with science and social studies teachers and members of the New York Conservation Society were: (1) state of balance; (2) interrelationships; (3) intelligent utilization of natural resources; (4) beauty; and (5) maintaining a safe and healthful environment. Final judgment of the categories of questions was made by two judges (a science teacher and an elementary school principal with a background in science). An oral interview of one-ninth of the total study group was attempted to obtain information about sources of the student's ideas. Analysis of the data revealed that experience and observation, as well as the use of science books, were the greatest sources of information about conservation utilized by the students sampled.

Hone (43) investigated some of the causes of discrepancy between American thought and practice with regard to conservation education. A nationwide inventory and analysis of conservation in school curriculums from kindergarten through the twelfth grade was conducted.

The data were tabulated according to categories which emerged as the most commonly used concepts of conservation. The categories were as follows: renewable resources, such as soil, water, plant and animal life; nonrenewable resources, such as metals, minerals, fossil fuels; human resources, such as health, safety, recreation, community resources, guidance.

The curriculum analysis revealed that more conservation material came from state than city school sources; that the states published general, whereas the cities published more specific, curriculum suggestions. There was, in general, consistency between the aims, content, and method of school and nonschool conservation education material. Conservation education was taught most frequently in grades six through nine. Most of the publications specifically for elementary or secondary schools came from school sources; nonspecific publications from nonschool sources. The format and extent of this sampling of the curriculums showed that the per cent amount of published curriculum space devoted to conservation education was relatively small. Conservation was seldom recommended as a separate subject. Conservation was found to be associated nearly twice as often with science as with social studies. Conservation education was found most frequently associated with science at the elementary level and with social studies at high school levels. Conservation education as indicated by the curriculum analysis was regarded by school people mainly as a renewable resource problem.

The study indicated that, although educators usually define conservation as the wise use of natural and human resources, the emphasis in most

curriculums, in the minds of most experts in conservation education and in most elementary science textbooks, is on renewable resources.

A nine year comparative study of the status of conservation education in the public elementary schools of New York State from 1955 to 1964 was made by Kenyon (50) ". . . to discover and interpret trends in the elementary teacher's philosophy, methodology, preservice and inservice education, and use of materials in conservation education" and ". . . to determine from elementary principals the essential needs for improving conservation education and the projects, activities, or organizations that currently contribute to conservation consciousness in the schools." Results obtained were compared with a similar 1955 study to determine trends and promising practices. It was concluded that the public schools of New York State had failed to change the status of conservation education over the nine year period. Few teaching and learning situations were consistently indicated as being used in the resource areas of soil, water, forests, wildlife, and minerals. A need for more conservation teaching on the elementary and secondary levels was evinced, as well as a need for inservice and preservice education of teachers. Handbooks of various types were also indicated as being desirable. It may be inferred from this study that teachers do not know what conservation concepts or principles to teach.

***Summary.*** The studies reported in the areas of concept development, organizing principles and concepts, and curriculum development, represent significant movement toward achieving definition, structure, and organization for purposes of teaching environmental concepts. Continued research in these areas will update and develop new concepts as emphasis in environmental concerns shift. A strong plea needs to be made for involving key concepts from the sciences, social sciences and humanities for environmental curriculum development.

## PROGRAMS

Analysis of selected outdoor, conservation, and environmental education programs has been attempted in a variety of ways and with varying degrees of success. The range is from examination of existing projects in order to obtain a spectrum of ideas for program improvement to a systems analysis approach for self-evaluation in relation to program structure and content. Similarly, the internal examination of programs has ranged from the utilization of subjective ratings by participants on one end of the con-

tinuum to quantitative measures with clinical or case study detail involving outside experts on the other.

## School Programs

Pulliam (65) surveyed successful outdoor education programs by questionnaire. Criteria for determining "success" were determined by a panel of three experts, data were obtained, and recommendations made for the improvement of a specific program. An attempt was also made to develop recommendations for a teacher in-service education program for the school system. A literature review was followed by the development of a questionnaire submitted to 60 jury-selected outdoor programs. Pulliam recommended that outdoor education be expanded in nearly all curriculum areas. Specific objectives, concepts and facts, and activities in the areas of the conservation of forest and grassland, water, soil, wildlife, and beauty of nature were suggested. A listing of activities was similarly provided for language, mathematics, health education, art, music, and first aid. Plans were also provided for a series of six teacher meetings and workshops to provide teachers with outdoor experiences.

The examination and evaluation of effectiveness of a conservation education program and the demonstration of the chronological process by which the program was integrated into the school was attempted by Stapp (81). A conservation education program was designed, content material prepared, in-service preparation provided for teachers, and evaluative instruments submitted to administrators and teachers involved in the program. Pupils from all grade levels (K-12) participated in a series of field trips to various community resource areas. Evaluation consisted of obtaining brief recall statements from administrators and classroom teachers indicating those features of the conservation program that were helpful in approaching the instructional goals of the school system. It was further determined on this subjective basis that "desirable interests, attitudes, and appreciations" (as well as desirable conservation understandings and concepts), were developed at all grade levels. It was also indicated that teachers were aided in becoming more effective in the presentation of conservation material. The program was suggested as a useful model (with slight modifications to meet prevailing conditions) for other school systems. Stapp concluded that the integrative approach for conservation education was effective.

Pike (64) attempted to select natural science experiences significant in elementary school outdoor education programs, and to organize these experiences into a proposed guide. The five groupings developed contained natural science experiences related to: (1) plants, (2) animals, (3) the physical environment, (4) conservation and (5) health and other social

manifestations. On the basis of the literature review and responses to the checklist devised, Pike concluded that elementary schools are charged with major responsibility in science and conservation education and that experts in outdoor education agreed as to the importance of selected natural science experiences in elementary outdoor education programs.

In an attempt to improve the teaching of conservation in elementary and junior high schools, a set of integrated sequential case units was formulated and tested in five Wyoming school districts [Diem and Hennebry, (20)]. Based on a total sample of 840 elementary students (38% usable responses) and 960 junior high students (49% usable responses), statistical analyses indicated that teachers' use of the guides and their classroom presentations were successful in stimulating student interest in conservation problems. With the exception of the sixth grade unit on minerals and oils which proved difficult and was rewritten, consistent student test performances in all school districts and in all other grades indicated that the materials were at an appropriate grade level of difficulty. Findings supported the value of the sequential resource unit approach to both the teacher and the student. In addition to an introductory guide to natural resources and their management, complete curriculum core units for each grade were developed and tested. These include wildlife, water, soils, grassland, forests, minerals and oil, pollution, human resources, and environmental usage.

Graff (30) attempted to identify the resources that Ohio children in grades four, five, and six considered to be important, and the extent and source of their understandings about these resources. The investigator had 2,232 pupils write essays entitled "What Conservation Means to Me" and provide biographical data and information about the sources of various types and categories of resources. Analyses were made of the depth of understanding indicated in the themes. The data were categorized and analyzed according to such parameters as grade level, parent occupation, and community size. The pupils' teachers supplied information about the teachers' own exposure to conservation courses and workshops.

Plants, animals, soil, and water were mentioned most often by the pupils. About one-fifth of them indicated understanding in only one of these areas, two-fifths in two areas, one-fifth in three, and about one-tenth mentioned all four. Minerals, recreation, human resources, etc., were infrequently mentioned. In rural areas the number of resources mentioned increased as the pupils grew older but in the cities and suburbs, the greatest numbers were mentioned by fifth graders. Children of professional and business men indicated greater understanding about the resources than did the children of farmers and laborers. The school was seen as the

principal source of conservation understandings, books were second, and parents and the home were third. Some children listed television as an important source.

Pupil conservation understandings were related to the exposure of their teachers to special conservation schools and courses, curriculum programs and inservice conservation training. They were independent of their teachers' university courses in zoology and botany. Graff also concluded that factors other than reading ability (as determined by reading grade placement scores) were more important in the development of conservation understandings for intermediate grade students.

Hill and Medley (40) conducted a pilot study to develop a device for research in teaching effectiveness. A Goal Oriented Teaching Exercise (G.O.T.E.) consisting of: (1) a four day teaching unit, (2) specific objectives for the pupil, (3) tests to measure pupil gains toward the specified objectives, (4) suggested teaching strategies, (5) instrumentation to describe teacher behavior, and (6) procedures for relating pupil gains to patterns of teachers' behavior. Four teachers were elected to teach a unit on Air Pollution for specific content objectives. Unit content was organized along two dimensions: substantive content (e.g. causes, effects, etc.) and types of instructional goals (i.e. application and recall) to form twelve content cells. Pupil gains were measured during the teaching unit by equivalent forms of a pre- and post-test to the unit. Teacher behavior was recorded by process, substantive content, and instructional goal. Each statement of the teacher was coded: (1) by using the OScAR 5V for information about social-psychological interaction, (2) by reference to the content cells of the total unit, and (3) by instructional goals. Pupil achievement data were then related to the measures of teacher behavior, cell by cell. The data provided grounds for drawing inferences both about teaching strategies and their effects on pupils. It was concluded that the G.O.T.E. data output provided a basis for analyses which combined quantitative measures with clinical or study detail.

An investigation to compare a specifically designed instructional program in conservation and forest fire prevention with the conventional presentation of these topics in a selected school system was undertaken by Gladen and Carkin (28). A semi-programmed instructional format was chosen to present the materials to be taught in order to minimize the need for teachers to modify the "learning package." Six experimental and six control groups were individually administered identical written and oral pre- and post-tests. Subjective confirmation by the teacher was also obtained. Both F-tests and t-tests were utilized in analysis of each test

item. Inconclusive evidence was encountered. Additional research was initiated but remains to be reported.

An evaluation instrument, utilizing the systems analysis approach for self-evaluation, was designed for use by project directors and staff in assessing existing Title III environmental and outdoor education projects in New Jersey [Ambry (2)]. The evaluation instrument was first developed about two years ago. The original instrument was presented to persons attending the National Conference of Environmental Education in May, 1968. Conferees, working in small groups with members of the original committee, worked on instrument revisions and changes. Four categories provide the basis for evaluation: planning and design, content, operation, and productivity. Self scoring procedures are included.

The most comprehensive analysis of environmental education programs accomplished to date was published by the American Association for Health Physical Education and Recreation (3). The study was a nationwide survey of programs in environmental, outdoor, and conservation education in operation in public schools in 1969-70 and covered all public school systems in the United States enrolling 1,000 or more pupils. The survey was limited to school systems having at least one half-time staff person assigned to environmental education. Seven-hundred eighty-one systems met the above criterion. A 37 item questionnaire was developed for use in the survey. Of the 781 systems identified as having a program, 702 (90 percent) responded to the questionnaire.

No general type of environmental education program was found. A wide variety exists. Most programs are entitled "Outdoor Education" and are aimed chiefly at upper elementary pupils. Only one-fourth operate on a year-round basis. Programs studied focused on the sciences and on applied science, notably conservation, ecology, biology, insect study, geology, botany, general science, and weather. Most systems use school grounds or free of charge sites in the area. A majority use sites with resident facilities. Few leaders in charge of such programs have had specific preservice training in environmental studies although workshops, inservice training courses, and conferences are utilized to off-set this problem. Funding was generally provided by the local Board of Education although about one-half also received some form of state, federal, or other aid. Most programs were combined and comprehensive elementary-secondary programs focusing on various aspects of ecological and environmental study. Three types of programs were found to exist: (1) a limited program for elementary pupils emphasizing acquaintance with an appreciation of the outdoors and nature; (2) an academic, classroom-oriented program for junior high pupils only, focusing on scientific and technical

aspects of environmental study; and (3) the comprehensive combined elementary-secondary program previously described. It was concluded that most categories investigated needed further exploration.

***Summary.*** Of the studies conducted to ascertain ways of improving programs, those emphasizing pre- and post-test means of evaluation and systems analysis techniques would seem to hold the greatest potential for future benefit. [Those attempts that appear rigorous enough to be acceptable include techniques used by Hill and Medley (40), Gladen and Carkin (28), Ambry (2) and the American Association of Health, Physical Education, and Recreation (3).] Comprehensive surveys of a regional or national scope also provide useful information about trends. Further emphasis needs to be given to systematic approaches to program evaluation and improvement.

## School Camps

Several investigators have attempted to evaluate existing school camping and resident outdoor education programs for purposes of initiating improvement or expansion of such programs. Procedures employed were generally subjective, with one notable exception. Several exemplary plans were recommended, but little objective analysis has been attempted.

Sharp (73) conducted a study of historic significance in devising a plan for the reorganization of the life summer camps. Recommendations were developed for the Life Fresh Air Farms, as were detailed working plans and educational programs. Four years later, Sharp reported that substantial progress had been made toward achieving the previously established recommendations.

An intensive survey of a school camping program was accomplished by Rhoades (67). The investigator interviewed sixth grade pupils and parents, before and after camp, in regard to their experiences. Sociometric tests were given and case studies were made of all those interviewed. The work and reactions of teachers and counselors, before and after camp, were recorded and analyzed. Twenty conclusions and sixteen recommendations were listed to be used in improving the use of the camp.

Pepper (62) similarly attempted to analyze school camping programs to identify objectives and contributions; identify and describe existing practices; demonstrate relationships between school and camp curricula; and evaluate programs by determining what parents, children and teachers consider to be valuable about school camping programs. He

found that significant contributions were made in social living; healthful living; purposeful work experiences; recreational living, and nature appreciation. Agreement also existed among opinions of campers, parents, and teachers regarding school camping.

Studies by Craddock (16), Hollenbeck (41), Kleindeinst (51) and Cragg (17) were generally concerned with the role of school camping in achieving the educational goals of a given school system. Data were collected by questionnaire, interview, and pre- and post-tests. Craddock and Kleindeinst reported that teachers and parents agreed on the need and desirability for including school camping in the curriculum and that living-learning experiences were of value to both children and teachers. Cragg contended that the one week school camp experience made definite contributions to educational development and that children in camp showed greater improvement in intellectual development than those remaining in the classroom. Hollenbeck's work resulted in recommendations for the development of school camp programs based on findings similar to those listed previously.

Outdoor education in the form of day camps, tepee camps, three-day camps, teacher-selected field trips, and a mobile nature museum was provided for children from deprived areas [Milwaukee Public Schools, (58)]. A total of 11,680 children from 44 elementary, junior high, and high schools participated in the program between May 1, 1966, and August 3, 1966. The day and over-night camping experiences took place at established camp facilities in wooded areas. Field trips were conducted to dairy farms, state forests, a zoo, and a conservatory. The mobile nature museum consisted of a mobile trailer containing displays which were described to the students by a qualified naturalist. Questionnaires distributed to students, teachers, staff members, parents, administrators, and a school psychologist led to the conclusion that: (1) this was a particularly valuable experience since such facilities were not generally available to the poverty area children, and (2) objectives concerned with the development of social-democratic living habits, new recreational and vocational opportunities, and interest and understanding in the outdoor environment were well met.

Cole (14) attempted to determine whether a work-learn camp for potential high school dropouts had greater holding power than the regular school program and to determine the extent of improvement of home, school, and social adjustments following the camp experience. Improved attitudes toward school were detected following the experience. Difficulties in standardization of the control group with the test group reduced the opportunities for drawing conclusions. However, there are implications

for unemployed youth in event of a recession or depression.

The educational effectiveness of a traveling school camp was examined by Shaw (74). Case studies, comparative study on a matched pairs basis, and a series of attitude and sociometric tests were administered. Substantial growth in attitude toward school, work, personal and social adjustment, and American history scores was noted. Shaw concluded the traveling school camp has a valuable contribution to make.

Grilley (31) and Johnson (49) both attempted to develop evaluation techniques for school camp programs. Grilley used survey forms pertaining to curricular experiences while Johnson developed appraisal instruments utilizing teacher and student evaluation. Both utilized the techniques with varying degrees of success. Grilley's instrument was modified by use, with an acceptable product resulting, while Johnson's was judged to be too time-consuming for practical routine use.

***Summary.*** Of the studies dealing with school camping, most were concerned with collecting data for improving existing programs. Results generally indicate that the programs were useful and helpful but such contentions are based almost entirely on subjective data. A stronger focus on objective analysis is needed.

## Teacher Education Programs

Several studies have been conducted to determine the kinds of teacher education experiences in outdoor education appropriate for elementary teachers, both preservice and inservice. Cyphers (18) attempted to identify those outdoor experiences useful to those teachers who wanted to extend their instruction beyond the classroom. An Experience Attitudinal Inventory form was produced which was used to obtain judgemental ratings from elementary teachers and a jury of experts.

Hammerman (34) attempted to determine the contribution of an outdoor experience on a pre-service teacher's understanding of the learning process. He reported that this outdoor education experience did not cause elementary education students at any particular academic level, of any personality type, or mental ability, to increase significantly their understanding of the facilitation of learning.

Rhead (66) developed an interdisciplinary approach to an outdoor education program for teacher preparation. After surveying 50 colleges and universities, he found that 18 had outdoor education programs. Six required students to have a resident experience. Rhead concluded that an outdoor education program combined with an outdoor school should be part of the curriculum.

Berger (7) and Mouser (59) were both interested in developing leadership training programs for outdoor education. Berger concentrated on competencies for elementary education majors while Mouser wanted to discover the nature and availability of training for outdoor education leaders. Berger concluded that no single experience or course could develop all the necessary competencies. An integrated program is suggested as a best approach. Mouser contended that weekend workshops should be offered more frequently and workshops in camp settings should last for about six weeks while including greater amounts of field study emphasizing ecological relationships.

MacMillan (54) surveyed school camp directors and counselors to identify their duties and responsibilities in order to make recommendations about the preparation of professional workers in the field. He reported that counselors and directors should have specialized training in science, in-service leadership, camp counseling, arts, crafts, music, and administration. A special knowledge of and an interest in children was also essential. MacMillan concluded that training in school camping and outdoor education should be provided by preservice teacher programs. Counselors and directors should be accredited teachers, experienced in conservation, the basic sciences, appreciation of environment, and ecology of life.

The National Academy of Sciences—National Resource Council conducted a study concerning undergraduate education in renewable natural resources (60). Reported are the recommendations of the panel on natural resource science of the Commission on Education in Agriculture and Natural Resources for Improving Undergraduate Education of Scientists, Managers, and Other Persons Professionally Engaged in Developing, Managing, and Protecting the Renewable Resources of the United States. The recommendations are supported by an extensive study of proposed courses and curricula, reports, articles; by recommendations by professional societies; and by standards of employing agencies. Current natural resource curricula are frequently characterized by insufficient emphasis on the natural and social sciences, a high degree of vocational orientation, and inappropriately narrow specialization. The general recommendations for all undergraduate curricula in renewable natural resources are (1) that students in these curricula be exposed to fundamental concepts and viewpoints of the natural sciences, mathematics, social sciences, and humanities regardless of intended professional specialization; (2) that after completing the fundamental program the students should concentrate in one of several broad areas such as plant science, animal science, social science, soil science, and water science; (3)

that work in specific professional areas may be added to the basic program and to courses in emphasis areas; (4) that electives be unrestricted; and (5) that interdisciplinary relations be stressed throughout the academic program.

Questionnaires were administered by Whaley (91) to selected representatives of the forestry, rural recreation, and wildlife management areas of public and private enterprises in northern California to determine the employment opportunities and type of training needs required for technical, skilled, and semi-skilled personnel. The primary objective of the study was to determine the role of the junior college in providing the necessary technician level training in the natural resource areas. The anticipated number of full-time placement opportunities for 1970 was (1) forestry: 64 professional, 209-219 technical, and 65-90 skilled and semi-skilled; (2) rural recreation: 8 professional, 72-82 technical, and 40 skilled and semi-skilled; and (3) wildlife management: 30 professional, 20 technical, and 31 skilled and semi-skilled. General education abilities in communication skills, applied mathematics, personnel management, technical drawing, sketching, and reading maps and blueprints were generally rated very important for technicians in the three areas. It was concluded that (1) there is a very definite need in both private and public sectors for people trained at the technical, skilled, and semi-skilled levels for the forestry, rural recreation, and wildlife management fields, although the greatest need is at the technician level, and (2) the junior colleges can offer needed instruction for training technicians in these areas.

***Summary.*** Based on the studies cited it appears that some outdoor experiences should be provided environmental education personnel. In addition a broad curriculum approach should be used that emphasizes the social sciences and humanities as well as the more usual natural sciences.

## MATERIALS

Two studies were concerned with reviewing instructional materials for conservation education [Johnson and Dambach (48), Gwinn (32)].

Johnson and Dambach (48) collected and evaluated free and inexpensive materials for use in conservation education. The objectives of the study were to determine (1) types of free and inexpensive conservation materials that may be needed, (2) kinds that were being produced,

(3) the quantity produced, and, (4) the aggregate expenditures for production. Efforts were made to analyze the characteristics of extant materials, to determine teacher awareness of conservation materials, and to recommend to the producers of the materials ways of increasing efficiency.

Materials for analysis were randomly selected from 7,524 titles received. Three sets of judges—educators, conservationists, and classroom teachers—evaluated the 1,541 pieces in the sample. A stratified random sample comprising about three percent of the teachers in Minnesota, Missouri, and Ohio was used in determining teacher awareness of conservation materials. Both national level materials and state level materials for each of the tested states were used in the assessment.

Based upon their data, Johnson and Dambach stated 60 conclusions about the materials. Among these were (1) at least 20,000 titles of free and inexpensive materials were estimated to exist; (2) most of the materials were for the general public but were of a technical nature; (3) more than three-fourths of all conservation materials were produced by governmental agencies; (4) biotic resources, including recreational uses of plant and animal resources, received coverage in half of the conservation materials with little attention paid to mineral resources, pollution problems, human resources, or management concerns; (5) the aggregate annual expenditure for the materials was estimated at well over $100,000,000, although, the actual cost per document was very low; (6) free and inexpensive materials were found to be ephemeral, with a half-life of slightly more than two years; (7) the majority of the materials overshot the readability levels of their intended audiences and at the same time provided insufficient depth of coverage; and, (8) teacher awareness of conservation materials was determined to be generally low.

After analyzing the sample of free and inexpensive conservation materials, all three groups of judges reported similar generalizations:

1. Most of the materials were of poor or mediocre appearance.
2. Bias (in topics covered) was at least as prevalent in governmental agency materials as it was in organization and industrial materials.
3. Only a fraction of the materials addressed to students was well oriented toward both curriculum and audience.
4. Only a small portion of the total of materials was directed toward social studies; most of the material was science oriented or assumed that science was the subject in which conservation was taught.

With respect to current concerns in environmental education, the results of this study of free and inexpensive materials might be best summarized in the words of Johnson and Dambach:

> It would seem that the producers of conservation materials have at least thrice missed the target; they have overshot on readability, undershot on depth, and have provided most for the least receptive of the three sets of teachers—the secondary science teachers. (48:127)

A related study is reported by Gwinn (32) in which the conservation content was evaluated in elementary and secondary school textbooks adopted by the State of California. Textbooks in the area of science, health, history, geography, and literature were examined by a committee of elementary, secondary, and junior college teachers.

Among other findings, Gwinn reported that:

1. Conservation was not presented as a discipline, as a subject, or as a way of life in any of the textbooks. For the most part the basic textbooks lacked any kind of definition, insights, or planned approach regarding conservation.
2. While supplementary textbooks appeared to contribute more to conservation education than did many of the basic texts, treatment was mostly cursory and in the form of broad generalities.
3. The quality of the basic textual investigations in the sciences left much to be desired. The investigations were often only demonstrations of already known facts, and, worse, many led to erroneous or half-true conceptions.
4. Several of the textbooks, particularly science, dealt with man's ability to change and modify the environment but emphasized only the positive effects. Harmful consequences stemming from man's lack of understanding were omitted. The need for an integrated resource-use plan did not seem important to the textbook writers.
5. Several social studies texts were found to briefly mention conservation measures but then dropped this subject, leaving the impression that conservation problems were insignificant. Where conservation of resources was mentioned, the traditional approach of conserving soil, mineral, or trees for future economic benefit was presented. Rarely did any of these texts offer an ecological approach to conservation.
6. Emphasis was placed on the great technological strides in all aspects of our living: big buildings, big dams, big cities, big highways. Almost totally lacking were suggestions of problems resulting from bigness: pollution, transportation, waste, uniformity and vanishing beauty.
7. One misconception almost universally expressed was the idea that the abuse of natural resources was something of the past, with the implication that abuses are being corrected and that the future will be rosy. Recovery and restoration appeared to be unmentionable or unnecessary concepts.

### *Summary*

While both studies were concerned with different kinds of materials, their findings tend to be similar. Conservation education materials were, in general, presented from too narrow a viewpoint, inadequate in depth and breadth, and inappropriate for both the intended audience and the treated content. Environmental concerns clearly require educational materials that deal with the interrelationships and with interactions of living things with the environment and which draw upon knowledge and understanding from all areas of the natural, physical, and social sciences.

## ATTITUDES AND BEHAVIORS

Twelve studies dealt with attitudes and behaviors. Of these, seven studies concerned with attitudinal or behavioral outcomes of experiences related to camping were grouped in this category.

### Existing Attitudes and Behaviors

Swan (82) reported a study designed to develop and test instruments for assessing attitudes and coping responses to air pollution of 173 senior high school boys in Detroit, Michigan. Two instruments were used: a forced-choice questionnaire which paired air pollution control with 12 other problem programs for cities and required the respondents to choose the more important program for each pair; and, two stories describing a specific air pollution problem which asked the subject how much time he would be willing to spend solving the problem. Swan found that air pollution was viewed as a relatively serious problem, chosen more often than all other environmental and social problem-solving programs with which it was paired, except problems in increasing job opportunities and improving police-community relations. However, he also found that despite the high concern expressed for air pollution, the subjects knew relatively little about air pollution or local control efforts.

In a study involving elementary school children in an urban classroom, Trexler (85) investigated the relationship between the children's testimony and their observed behavior regarding conservation behaviors. He also examined the relationship between the consistency of the children's testimony and their intelligence quotient, their sex, their academic achievement, and the type of housing they lived in. He found that the correlation (.03) between what children testified they did and what they actually did was not strong enough to suggest that their testimony could be relied

upon to ascertain their actual conservation behavior. Analyses of the data led Trexler to conclude that none of the personal factors tested could be shown to affect the consistency of the children's responses.

George (25) reported a study designed to determine whether knowledge and understanding resulted in more favorable attitudes toward conservation. A Likert-type attitude scale related to conservation was used to make 1618 observations, representing three different age and educational levels: Group I, 585 high school students; Group II, 462 college students; Group III, 571 adults. There were three phases to the study. First, the conservation attitude scores were compared for differences between the groups. Second, the scores were related to factors affecting conservation attitudes: personal characteristics, extra-curricular activities, and 4-H conservation projects. The third phase dealt with attitude change resulting from a special conservation education experience designed specifically for each group.

George found significant differences in attitudes among the three groups as indicated by a comparison of the total mean scores. The high school students had a mean score of 184.08, while the college students had a mean score of 191.32 and the adults, 196.93. Of the four personal characteristics studied, age and education were associated with the most significant differences in attitudes of the high school students. The most significant characteristics in the college student group were age and sex, while sex and residency background were significant for the adults. Extra-curricular activities with an apparent conservation emphasis, such as conservation clubs and nature camps, had the greatest positive effect in the development of conservation attitudes.

George found that attitudes toward conservation did change, that the changes were associated with interest motivation, and exposure to conservation knowledge, and that significant attitude change could be identified and associated with the special conservation educational experience designed for each of the groups.

Hug (45) reported a study to discover and analyze the factors which either encouraged or discouraged the use of outdoor instructional activities by intermediate elementary school teachers. He developed an instrument for interviewing teachers about school, environmental, and teacher-related factors. The factors were related on a continuum from strong encouragement to strong discouragement. Teachers using outdoor instructional activities were compared to teachers who did not utilize the out-of-doors.

Hug reported that although most factors were not statistically significant, teachers active in outdoor activities were younger, had more children, had 1.3 fewer years teaching experience, had more degrees, had attended

more college outdoor-related courses and had been enrolled in college more recently than the non-active teachers. The make-up of the class had little bearing on the use of the out-of-doors, but classes with one or more low IQ pupils used the out-of-doors less often. Classroom factors of grade level, ability level, availability of proper clothing, general health, and socioeconomic class had no, or only minor, influence on the utilization of the out-of-doors. None of the community factors was significant, and little or no significance was found for the teacher factors of age, health, home responsibility, personal grooming, educational preparation, and disruption of usual classroom routine.

Using five dimensions of conservation attitudes representing basic value-attitudes an individual would normally acquire during the natural acculturation process, Hoover and Schutz (44) investigated whether differences in conservation attitudes existed between science and non-science majors in selected colleges and universities throughout the country. The comparison of science and non-science majors was undertaken because conservation education has traditionally been handled within the province of science education.

Subjects consisted of 785 students of at least junior standing in 14 different colleges and universities during the 1962-63 school year. The students were divided into three major groups: 132 forestry majors; 260 science majors; and 393 non-science majors, most of whom were elementary education majors. A scale of 92 items constructed on the basis of the five dimensions was used. Each item presented a brief hypothetical situation to which the student recorded his approval or disapproval, using a five point Likert-type scale.

Hoover and Schutz reported that although analysis of variance indicated significant differences among the groups, the differences were so slight as to have no practical significance. From this they concluded that science education had little impact on basic conservation attitudes and that the effect of college curricula upon modification of basic attitudes was far from encouraging.

***Summary.*** Based upon the five studies reviewed it appears that:

1. The ability to identify or recognize environmental problems does not necessarily imply knowledge or understanding of the problem.
2. Statements of behavior with respect to conservation concerns do not satisfactorily predict observed behavior consistent with such statements.
3. While attitudes favorable to environmental concerns are related to past experiences, there is little evidence to suggest that formal

science education enhances these attitudes more than does education for the non-science major.

4. Some evidence does appear to suggest that positive attitude change is promoted by interest motivation and exposure to conservation education experiences.

## Camping and Attitude/Behavior Changes

Two studies in this category reported changes in students who were education majors and who were taking part in camping experiences as a part of their preparation for teaching. Heppel (38) investigated changes in college juniors after they had experienced five days of a school camp situation with children. Data were obtained from the 45 juniors through a questionnaire, a daily log, a supplement to the log, and by an attitude scale of teaching values. She found that students who were majoring in elementary education generally reacted differently from secondary majors. All students experienced anxiety the first two days, but this changed to confidence later in the week. Attitudes expressed as changed included awareness of the different environment, appreciation for informal group activities, individual differences, insights into children's interest spans, cooperativeness, eagerness, and personality fluctuations. Elementary education students generally formed more positive attitudes toward a camping program that did the secondary majors.

In a related study, Hauserman (36) focused on the classroom performance differences between student teachers with an orientation to the outdoors and those without this orientation.

In addition to the regular course work the experimental group received an introduction to outdoor education by observing a sixth grade camping program, by viewing and discussing films, and by then becoming actively involved in a school camping program while taking part in a school outdoor education unit. The control group (an equal number of students) attended classes in the required education sequence but received no formal work in outdoor education. Both the control and experimental groups were scheduled for student teaching internship during 1962-63; observations were made of their behavior using the Observation Schedule and Record (OScAR).

He hypothesized that the student teachers who had received the outdoor education orientation would have a higher mean score on the emotional climate factor than would the students in the control group; that there would be more of a relative emphasis on verbal learning in the classroom of the student teacher who had not had the special treatment;

and, that the social structure would center around the teacher more in classrooms of student teachers who had not had the special treatment than in the classrooms of those who had received the special treatment.

The null hypothesis concerning the emotional climate was rejected while those concerning the verbal emphasis and the social structure were not rejected. Hauserman concluded that there was a difference in the way student teachers behave in the classroom; there was a warmer emotional climate in the classrooms where the student teachers had an orientation to the out-of-doors.

In a study which included children, parents, and superintendents as well as teachers, Rupff (71) investigated the extent to which the aspirations or objectives of school camp programs were being achieved. Objectives for short term camping programs were identified by examining the literature and educational criteria. These objectives included self-realization, human relationships, economic efficiency, and civic responsibility. Questionnaires were prepared and administered to 254 sixth graders, 173 parents, and 21 teachers in the programs being studied. Eighteen school administrators were interviewed about their perceptions of the value of their school camping programs.

Rupff compared boy camper responses to girl camper responses in a preliminary breakdown and found that there were no significant differences except in the case of reactions toward work tasks and feeling toward teachers after camp. The campers felt that they ate new foods, followed safety rules, and learned about nature. In addition, they indicated they enjoyed camp and that, within their peer group, they learned of an increased need for friends and skill in getting along with others. Parents and teacher-counselors tended to agree with the campers, but the teacher-counselors were significantly more enthusiastic than were the parents in their ratings in all items. In his interview with superintendents, Rupff found that their aspirations for school camping differed from those of the teachers. Teachers emphasized program and curriculum but superintendents emphasized the administrative aspects. Except for finance, most of the superintendents knew little about the details of camping programs or what was being done. All of those with programs believed that the camp was achieving good results in science teaching, health and safety, development of personality, and special democratic values. Rupff concluded that part-time camping in Michigan was achieving its aims to a reasonable degree, but that attention was needed in regard to uniform definitions, development of teaching methods, interpretation of values, and improved financial support.

In a study more specifically concerned with pupil behavior, Kranzer

(52) examined the effects of a five-day resident camping experience on two sixth grade classes as compared to one class which did not experience the camping activities. Aspects considered were social, emotional, intellectual, physical, and democratic group living. A second purpose was to generalize about the improvement of instruction by teachers who had undergone the camping experience.

Instruments for measuring the effects of the experience included Woods' Behavior Preference Record, the Haggarty-Olson-Wichman Behavior Rating Schedule, and sociograms. Instructional improvement was evaluated by Baxter's Rating Scale of the Teacher's Personal Effectiveness and by observations and opinions of teachers, student teachers, parents and visitors.

Kranzer concluded that social and democratic behavioral changes took place more rapidly during a camping program than during a regular school classroom program. Boys seemed to profit more than girls. Students with low mental ability showed a slight improvement in critical thinking. The number of isolates tended to increase beyond what would normally be found in the classroom. Ratings by adults generally favored camping as increasing group acceptance, better motivation, and stimulation of class work. Adult ratings were generally higher than ratings from test instruments, suggesting to Kranzer that the standardized instruments may not be very valid in measuring a change that takes place in such a short period of time.

Three studies concerned with self- and social attitudes were identified. The first, reported by Beker (6), evaluated the effects of school camping on self-concepts and social relationships of pupils. Seven groups of school campers were used as subjects with comparable groups used as controls. A 56-item checklist was devised and used to evaluate pupils' self-concepts while changes in pupils' social relationships were assessed by means of the Classroom Social Distance Scale. The experimental and control groups responded to these instruments immediately prior to and immediately following the school encampment, and ten weeks after the encampment.

Beker found that the experimental groups showed more positive feelings toward themselves after the camp experience than before. These changes were of greater magnitude than those of the non-camper control group. The patterns of social relationships were influenced in a positive direction and the changes were even greater ten weeks after the camp experience.

In a similar study, Stack (80) assessed attitudes toward selected concepts of school, teachers, self, classmates, friends, and school camping possessed by fifth and sixth grade pupils before and after a school camping

experience. Data were obtained from 44 boys and 44 girls who engaged in one week of camping. Stack concluded that: (1) the school camp did provide unique opportunities for effecting social change, particularly in regard to racial cleavage; (2) pupils regarded school more positively after camp, with widened friendship patterns exerting an influence for an improved emotional tone in the classroom; (3) teacher-pupil rapport was improved; (4) values of relationships and associations over those of the ego-concept were increased; (5) no appreciable improvement in the sociometric work-companion ratings of neglectees and isolates was effected; and, (6) school camping served, for boys particularly, as a new stimulus to rekindle interests regarding school, teacher, camping, and self.

In a comparative study of two opposing school camp curricula, Davidson (19) investigated the changes in pupils' self concepts and social relationships. Two classes of fifth and sixth graders were randomly assigned to different philosophically oriented school camp programs: one adult-centered, the other, child-center. Pupils responded to a self-concept check list and to the Classroom Social Distance Scale. Davidson found that both encampments produced positive change on the self-concept scale but on entirely different items. Nevertheless, camper growth in self-concepts did not vary significantly between the two different approaches. Social relationships in both encampments also revealed positive change.

***Summary.*** When the results of the studies in this section are considered, camping programs appear to:

1. promote a positive gain in self-concept by pupils and perhaps by teachers as well;
2. positively affect social relationships both among peer groups and between teachers and pupils;
3. by their relatively novel and informal organization, tend to stimulate interest and cause positive behavior changes that subsequently carry over into the classroom for pupils and teachers alike;
4. effect some knowledge gains as indicated by some test instruments and perceived by many of the participants but produce only slight evidence for improved thinking skills;
5. provide experiences which cannot be presumed sufficient for all pupils since isolates and neglectees did not appear to improve in the rankings of their peers.

# IV. Administrative Concerns

## GUIDELINES

A variety of investigators have conducted studies to examine existing programs dealing with outdoor education and school camping for purposes of developing guidelines and recommendations to be used to improve existing outdoor education programs. The research examined can be categorized in two areas: (1) school, and (2) school camp or resident outdoor education.

Weiss (90) developed a guide for elementary teachers for utilizing park facilities in an urban area to enrich science instruction. Values for such a program, facilities available, field trip procedures, appropriate science concepts, and a resource guide were developed. Questionnaires, interviews, and a literature search were procedures employed. Weiss included conservation, humaneness, and machines in addition to natural science topics of plants, rocks, and animals, as well as the usual park site visitation.

Hibbs (39) analyzed the extent of development and use of outdoor laboratories for teaching conservation by public schools. Schools in four states were queried by mail, followed by personal visits by the investigator. Suggestions for the development of outdoor laboratory areas were given with emphasis on committee structure and the involvement of potential users of the facility. A primary function of the site was to provide learning opportunities necessary for implementing a sound conservation education program.

Homan (42), and Ferris (22) studied various outdoor education programs to develop specifications for programs and facilities. Homan

formulated criteria by jury. He subsequently produced some very general conclusions and recommendations for the development of outdoor school site facilities. Results described were so diffuse as to render the study almost useless. Ferris applied more rigor to his investigation and used questionnaires to elicit information from directors of adult education centers. Those outdoor education characteristics collected were submitted to a jury, and an outline of desirable factors was produced. Characteristics of "good programs" were suggested, along with a variety of techniques for use in carrying out an outdoor education program.

Nine investigators have explored various aspects of school camping in order to develop guidelines. McKnight (56), Schaffer (72), Bain (5), and Squires (79) developed guidelines for the initiation and operation of resident outdoor education programs that were to be of use to school administrators. Procedures utilized by these investigators were similar and included a literature search, questionnaires, and interviews with practitioners in the field. McKnight concluded that the quality of leadership and program were the two most important factors in any school camping program. Schaffer supported this contention and suggested that the program should be viewed as an integral part of the total school operation. A regional approach to the operation and maintenance of facilities was indicated. Extra salary should be provided for this work and/or the reduction of load in order to prevent an overload condition for staff of the program. McKnight also called for the development of objective evaluation techniques. Bain's findings were similar, and a day camping program was suggested as a fifth grade approach preceding the sixth grade resident program. Squires (79) established some standards for public school camping in the areas of membership, leadership, program, administration, institutional organization, and profession. However, camp experts disagreed on the value of standards and which standards were acceptable.

Philpott (63) and Thompson (84) developed guides for school camping in two different geographic areas. Philpott identified fifteen influences including recognition of the need for conservation, increases in juvenile delinquency, the whole child concept, an activity approach to the curriculum, and acceptance of outdoor education values. A guide entitled "School Camping in Florida" was subsequently produced. Thompson concentrated on the development of outdoor instructional areas, overnight or weekend trips, and multiple day-camping. A plan was devised and submitted to the local board of education.

Carlson (11) conducted a study to appraise camping opportunities for youth, particularly those disadvantaged youth from central city and rural poverty areas. Procedures included a national estimate of the total

number of youth in camps during June 15—September 15, 1968, as well as small sample surveys to determine value of camping and related substitutes or alternatives; obstacles encountered in serving disadvantaged youth; problems encountered by camp operators and social agencies; and the monitoring of selected camps to develop models of camping success. A manual of procedures for community action in camping was subsequently produced.

Archerd (4) proposed a plan for initiating and developing a school camp at a selected state teachers college in New York. Educational objectives were identified, and 73 principles to guide the development and administration were formulated. The nine recommendations made included selection and preparation of leaders, finance, selection of the camp site, health and safety, food management, business administration, and program planning. These nine recommendations were subsequently revised by a seven member faculty group.

Colaw (13) planned and established an outdoor education and camping program for his school district. Various programs were visited and interviews conducted regarding curriculum, facilities, finance, organization, and relationships with other local agencies. He found resident programs limited to elementary schools and financed through local tax money. The program established by Colaw was financed by Title III monies.

### Summary

A variety of recommendations for the establishment of outdoor oriented programs have been produced. It is apparent, however, that after adaptation to local settings, administrative structures, and educational objectives, generalized recommendations are of little use. Therefore, more attention ought to be directed toward objective evaluation of concept and attitude attainment in relation to a given administrative structure, program, facility, or site.

## ADMINISTRATIVE PRACTICES

Ten studies related to administrative practices and concerns were identified. Of these ten, eight were concerned with the establishment or operation of school camp programs, one reported on legal aspects of camp operation, and one study considered the role of the coordinator in outdoor education programs.

Gilliland (27) appraised and analyzed administrative practices and policies related to the development of school camping programs. Data

were gathered through interviews and school camp visitations, and from the literature. Observations and interviews took place in 40 school systems operating camps. Major administrative concerns identified were related to (1) developing interest, (2) planning the program, (3) staff selection, (4) health and safety, (5) interpreting camp to the community, (6) financing the school camp, (7) developing leadership, (8) business management, and, (9) meeting legal problems.

Smith (78) investigated personnel practices and program organization of public school camping. Data were gathered from the literature, from visiting three school camps, and by means of a questionnaire checklist designed to collect information related to the site, operating agency, facilities used, program organization, personnel practices, and school-community cooperation. Fifty-five school systems from eighteen states were represented in the returned questionnaires. Smith found considerable variation in camp site characteristics and organization as well as among personnnel and program practices. He particularly recommended further study of program appraisal measures.

In a related study, Walton (89) investigated the administrative practices in use in 30 part-time outdoor education camps in Michigan. A review of the literature resulted in the classification of administrative practices into a) facilities, b) personnel, c) program, and d) school camp-community relations. A personal interview was held with the camp directors, with 179 items comprising the interview schedule. Walton found that all but three part-time camp programs used state owned camps, distance away from the school was not a factor in site selection, and that half of the camps had some infirmary facilities. Most of the camps were for sixth graders. Substitute teachers were provided for students who could not attend camp. Staff participation was voluntary in over 85 percent of the cases. In 95 percent of the programs, the camp director had other teaching or administrative duties in addition to the directorship. Precamp orientation was provided for school staff in the majority of cases but was provided for non-school staff in only about half of the cases. Program planning was done by teachers and pupils in all programs. Non-objective evaluation was most frequently used and involved campers, teachers, parents, and other community sources. All camp directors agreed some form of public relations technique was needed to interpret the program to the community.

Christman (12) used historical and normative survey methods to investigate the progress of outdoor education and school camping in New York public schools. He found only three year-round camping education programs in operation at the time of his study. He concluded that the

school camp should be organized and administered by the same public authority which operated the schools. He also concluded that camping programs should serve all age levels; that pupils should attend camp of their own volition; that the school camp should be coeducational; and that the school camp should not exceed 40 pupils.

Hebel (37) reported a study to formulate procedures for the New Jersey State Department of Education to use in organizing and administrating school camps for the public schools. He reviewed the literature on camp organization and administration and then interviewed directors of camping programs and made personal observations of many of the camps. On the basis of 68 principles derived from the literature, Hebel isolated 12 factors as influencing New Jersey education. From these factors, recommendations were made that would meet educational objectives as well as provide direction for the establishment and operation of outdoor school camps.

In a more recent study, Turner (86) identified administrative procedures being used to establish and operate outdoor laboratory programs. A questionnaire was sent to superintendents of schools throughout the United States operating resident outdoor laboratory school programs. Items included on the questionnaire related to finance, facilities, public relations, transportation, insurance, staffing, food service, timing, and board policy. Turner found that school size did not seem to be a factor in the operation of the programs. Most of the programs had been in operation more than eleven years. Fifth and sixth grade students were most frequently involved. The spring and fall seasons were most popular for conducting outdoor laboratory programs. Most of the districts charged the students a fee for the program. Most sites were leased or rented rather than being school-owned. The respondents indicated that staffing, facilities, and finance were the most prevalent and persistent problems. Turner concluded that more trained teachers, laboratory sites and facilities, and additional sources of funds were needed if such programs were to be continued and expanded. The total educational cost per student, however, did not appear to be related to whether or not a district had a resident program.

Similar concerns were investigated by Ambry (1) who identified administrative problems connected with the operation of resident outdoor education programs in an attempt to isolate those which might be unique to outdoor education. Data were gathered by means of a questionnaire administered to 90 school districts. He found it possible to identify administrative problems unique to outdoor education but that these problems were not necessarily the most difficult to solve. Problems rated

most difficult were those dealing with staff. Judged to be of ordinary difficulty were those problems of legality, finances and budget, and miscellaneous problems; least difficult were problems in the areas of curriculum, public relations, and those dealing with boards of education. Ambry concluded that identifying the uniqueness of problems associated with outdoor education and the degree of difficulty could lead to the better solution of the problems.

Lantz (53) reported a study to formulate a set of principles for the operation and administration of camps by colleges and universities. The literature was reviewed along with information collected from authorities and from a survey of college camps. From these data a list of recommendations for effective camp operation was compiled. Lantz concluded that although college camps exist for different reasons, there were commonalities. Camps should be modern rather than primitive and should have facilities for a minimum of 75 students and a maximum of 150, with provisions for offering both elementary and advanced courses. Because camps generally rely upon motor transportation, sites should be located near an all-weather road. Staff members should be regular staff members with only a few visiting professors; student help should be utilized as much as practical to ensure an adequately manned staff. Lantz considered adequate health facilities a necessity and a preregistration examination a recommended requirement. Also needed is an adequate physical plant with the areas for service, instruction, living and administration as the usual arrangement.

Freeburg (24) reported a study to determine the legal liabilities of municipal, charitable, and private organizations related to the operation of a recreation camp and to analyze state department regulations applicable to recreation camps. He examined previous studies, legal texts, periodicals and law journals. The statutes of each state were searched and statutes relating to the problem were then analyzed. Court decisions were then searched in a similar manner and the then most recent cases were traced and their validity confirmed. Among the conclusions drawn by Freeburg were: (1) recreation camps were affected by laws at all governmental levels—municipal, state, and federal; (2) specific state health and sanitation regulations in most instances had the power of law; (3) camp leaders were considered in *loco parentis,* as being the lawful parents of the children for whom they assume responsibility; (4) the liability for charitable corporations for torts varied from unqualified liability in a few states to full immunity in others; (5) some courts considered camping an extension of the park and playground systems; and, (6) the American Camping Association standards were legally and ethically sound.

In another study concerned primarily with a single major aspect, Rillo (68) investigated the perceptions of outdoor education coordinators of their own role, and the perceptions of teachers and school superintendents of the role of these coordinators, and identified points of consensus among the referent groups. A checklist of 45 items of roles believed appropriate for outdoor education coordinators was developed and administered. Participants were the superintendent, outdoor education coordinator, and three teachers in each of the 90 school districts in the U.S. having a three day or longer resident program and employing a person to coordinate the program.

He found no significant differences of role expectations for the coordinator on 36 of the items, and significant differences among the three sets of respondents on nine of the items. All groups gave greatest response to the role: "To assume leadership in planning and organizing the outdoor education program as an integral part of the total school program." Teachers and coordinators gave second highest response to: "Work closely with teachers and assist them in developing an outdoor education program for their classes." Superintendents, however, gave second rank to: "Assuming leadership for constant and continuous evaluation," and, "Make recommendations for improvement of the outdoor education program." The nine items for which there was a lack of consensus included the coordinator's role in requesting increased funding from the board of education, and making policy changes.

Rillo concluded that there was a high degree of consensus among the three groups used as role definers for the position of outdoor education coordinator; that the position was a professional one instituted in the public educational system to administer and coordinate the outdoor education program as an integral part of the total school curriculum; and, that a major portion of the coordinator's role was concerned with working with teachers and helping them develop an outdoor education program for their classes.

## Summary

Considering that the studies reviewed span the past two decades, problems related to administration of outdoor education programs appear to remain relatively constant. Because environmental education clearly requires direct contact with the out-of-doors as a part of the educational process, it seems likely that most, if not all, of the administrative problems will persist for some time to come. Based upon the reported studies, the major areas of administrative concern may be summarized as:

1. Development of interest and motivation,
2. Planning and developing an instructional program,
3. Leadership and staffing,
4. Health and safety,
5. Legal responsibilities,
6. Financing and management,
7. Selection or establishment of sites and facilities,
8. Program evaluation and appraisal,
9. Community information and public relations.

## FACILITIES AND SITES

Studies to analyze (1) ways in which facilities have been used and (2) site requirements for outdoor and science education programs have been conducted by eight investigators.

Shelar (75) identified ways in which the out-of-doors is being used in public school and teacher education programs. Categories of interest included school yards, school forests, school farms, school sanctuaries, and privately owned facilities. He concluded, at that time, that relatively little field work was taking place in connection with natural science which utilized any of the above mentioned sites.

Vogt (88) examined vacant lands and buildings in a selected political unit to determine their educational value. The investigator found 15,000 acres of vacant land with 760 acres being available for use. Buildings were also found which would meet a variety of needs for school camp facilities through recreation centers. Vogt recommended that educational planners pay particular attention to lands and facilities available within their districts as resources for education.

Hulett (46) evaluated the quantity and quality of facilities for school camping and other outdoor education on state owned lands in Illinois. All surveyed areas had facilities for some phase of outdoor education. No public school in the state was more than 40 miles from a state-owned facility for school camping and outdoor education. Recommendations for the use of such facilities were suggested.

Tankard (83) established site requirements for elementary schools in the state of Virginia. Outdoor space to support activities was deemed useful in achieving educational objectives. Space needs for an excellent program with an enrollment of five to thirty-five classrooms were suggested to require 2.62 acres to 8.22 acres. Other conclusions drawn per-

tained to the adequacy of facilities and planning requirements and the relationship of outdoor instruction to objectives of education in Virginia's elementary schools.

Bruning (9) investigated ways in which school administrators and community planners can aid the school site selection process by working together on a community master plan. Many communities developed such a plan under state and federally aided funding programs. Site selection principles required consideration of factors other than student population distribution. Ideally located, easy to develop sites within easy reach of utilities should be chosen. Careful study must be made of alternate sites. To assist in the selection process, a site planner should be employed. When a site is finally chosen, detailed maps should be obtained, personal surveys should be made, as well as a preliminary site study by an engineer. Site development should involve planning for three basic areas: the approach area, the service areas, and the outdoor living areas. Landscape materials used in development should consist of invisible and visible materials. Quality products should be used in the invisible materials because later problems can be avoided. Visible materials should include such items as sidewalks, roads, terraces, trees, shrubs, and lawn areas. Once installation is complete, provision must be made for maintenance. Time and cost efficiency should be the main objectives of such a program.

Several factors are presented by Mickolic (57) in his investigation which made it apparent that those in the camping profession should accept the fact that outdoor education will take place on a variety of levels. In keeping with this, a partnership between school districts and camps is discussed, along with host camps' basic services of personnel, food services, health and safety, housekeeping, facilities, pre-camp orientation, and programs. Additional possible services are listed, as well as school personnel responsibilities relating to supervision and guidance, daily care of facilities, teaching supplies, program scheduling, and transportation.

A special situation was investigated by Gilbert (26) that is of interest if a continuum of sites and facilities is being considered that would extend from the school grounds outward and into the community. He determined that guided natural history museum tours of a half-hour duration can make possible significant gains in achievements in the topics in which the museum is a rich resource. It was suggested that such trips help to make the subject more realistic, increase knowledge and appreciation of the environment, and create interest. Preparation and follow-up activities, adequate observation time, and teacher preparation are essential parts of the experience.

## Summary

Based upon the preceding studies it is clear that facilities do exist for a variety of outdoor oriented environmental programs. Those facilities usually exist within walking distance up to about 40 miles distance from the school. Utilization of resources in the community, such as vacant lots, parks, and museums, provide for a variety of educational experiences not possible in the classroom.

# V. Recommendations

Based upon the research conducted over the past two decades, it is clear that several problems require further research endeavors. For convenience, suggestions related to these areas have been listed under appropriate headings.

## PHILOSOPHY

Research in the following areas needs to be pursued:

1. the role of environmental education in the teaching-learning process;
2. the role of the school in relation to citizen environmental actions; and
3. perception of viewing environmental problems and approaches to solutions in relation to the educational process.

## INSTRUCTIONAL CONCERNS

Based upon the array of studies related to instruction, it appears that there is need for further study of:

1. organization of environmental concepts and principles in varying orders and sequences for determination of effective conceptual structures for teaching purposes;
2. validation of the more recent concepts lists utilizing a wide array of opinion from the various disciplines;
3. development and research on the effectiveness of teaching activities appropriate for conveying the various environmental concepts and principles; and,
4. procedures for combining environmental concepts with the social sciences, sciences, and humanities in order to achieve environmental understanding.

## PROGRAM EVALUATION

Approaches used to analyze existing programs ought to involve a variety of procedures.

Further attention should be directed toward:

1. developn.ent of clear and exemplary program models;
2. systems analysis of short term program effectiveness;
3. longitudinal research on overall program effectiveness;
4. research on program content, structure, and operational procedures;
5. more attention to the objective appraisal of program content and objective attainment; and,
6. continued work on analysis procedures utilizing more rigorous techniques should be developed that are appropriate for the resident setting.

## MATERIALS

In view of the findings of those studies on instructional materials, it appears that new materials should be produced that:

1. draw substantially on a sound conceptual base derived from the disciplines;
2. are targeted toward an intended audience and reading level; and,
3. are produced in a stimulating and interesting format.

## FACILITIES AND SITES

Factors other than availability of site ought to be further analyzed to determine ways of enabling students to learn with respect to factors such as:

1. the role of "on-site" experiences in concept attainment and attitude formation;
2. optimum facilities, design for learning environments; and,
3. the function of natural features or stimuli for learning.

The researchers cited in this paper have addressed themselves to numerous aspects of environmental education such as problems of philosophy, program development, evaluation of instructional materials, selection of sites appropriate for learning, and outcomes of programs. However, none of these investigators appear to have considered environmental education on other than a local, a regional, or a national basis. If environmental education is to be truly effective, it must emphasize the world-wide nature of the problems. Clearly, the research problems involved in such a task are monumental because the research design needs to be appropriate for developing, implementing, and evaluating environmental education from a global viewpoint.

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